

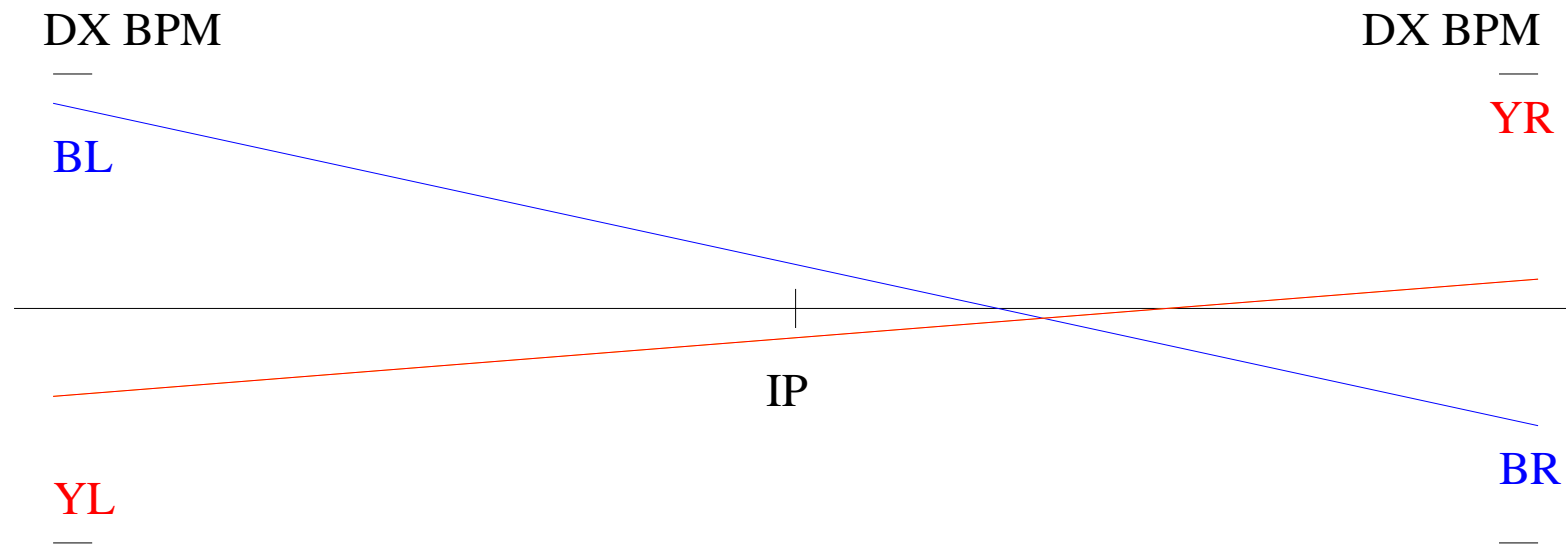
10 Hz IR Orbit Feedback Status

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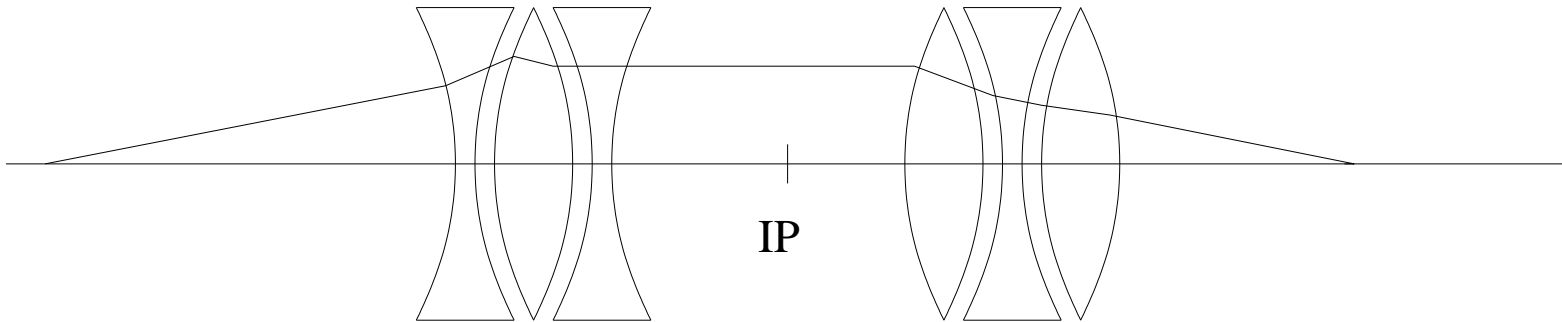
RHIC Retreat, July 10-13, 2006

The relative IP offset of the two beams is derived from the DX BPM signals as

$$\delta = \frac{BL + BR}{2} - \frac{YL + YR}{2}$$



The IP offset signal δ is digitized, filtered and applied to a 2-bump across the IP, generated by warm correction coils in the BLUE ring.

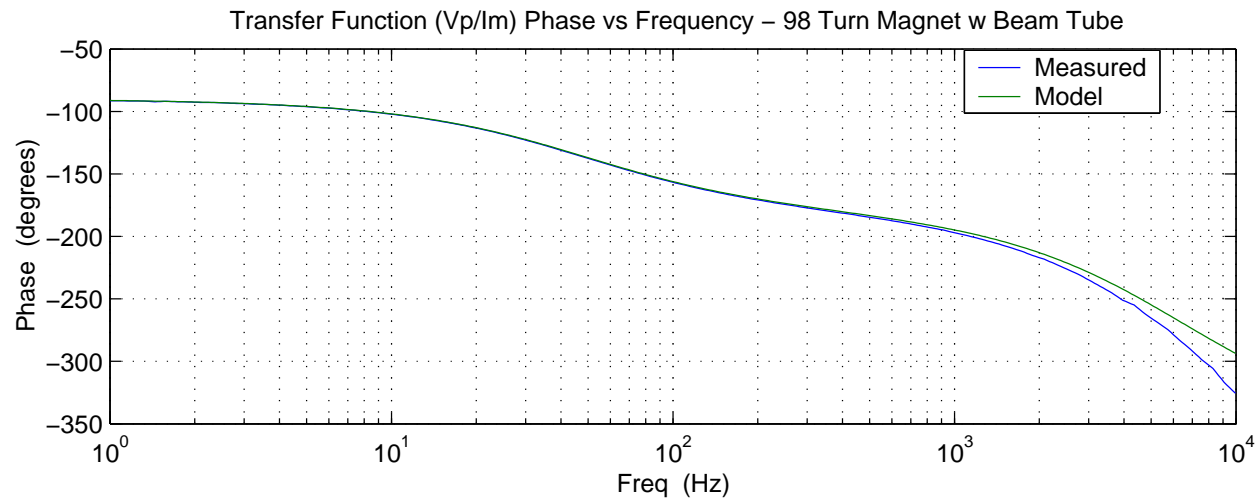
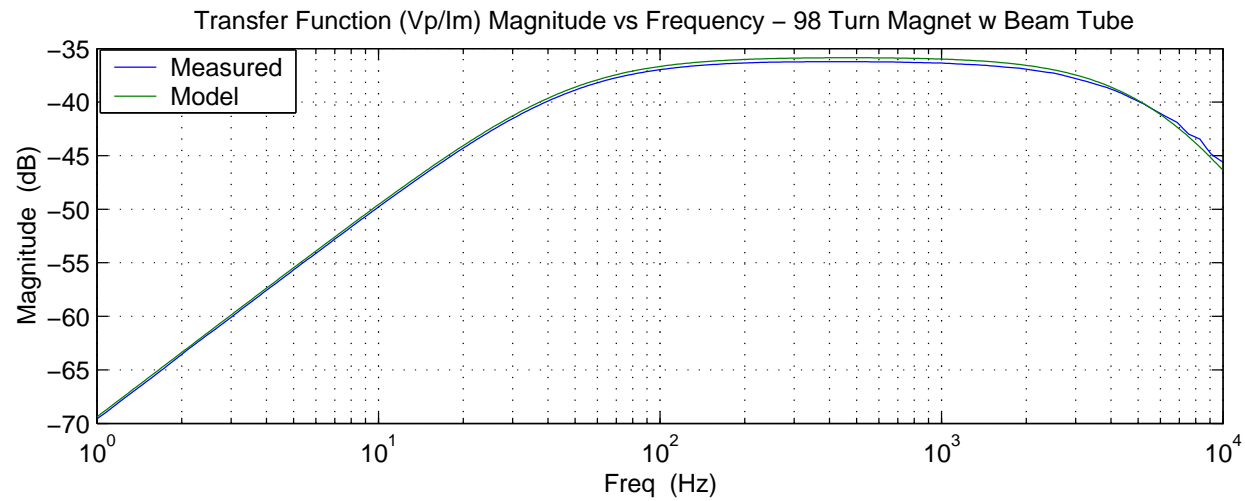


Warm correctors are installed in the focal points of the triplets.

Different kick angles are reflected in the number of turns, so magnets can be connected in series.

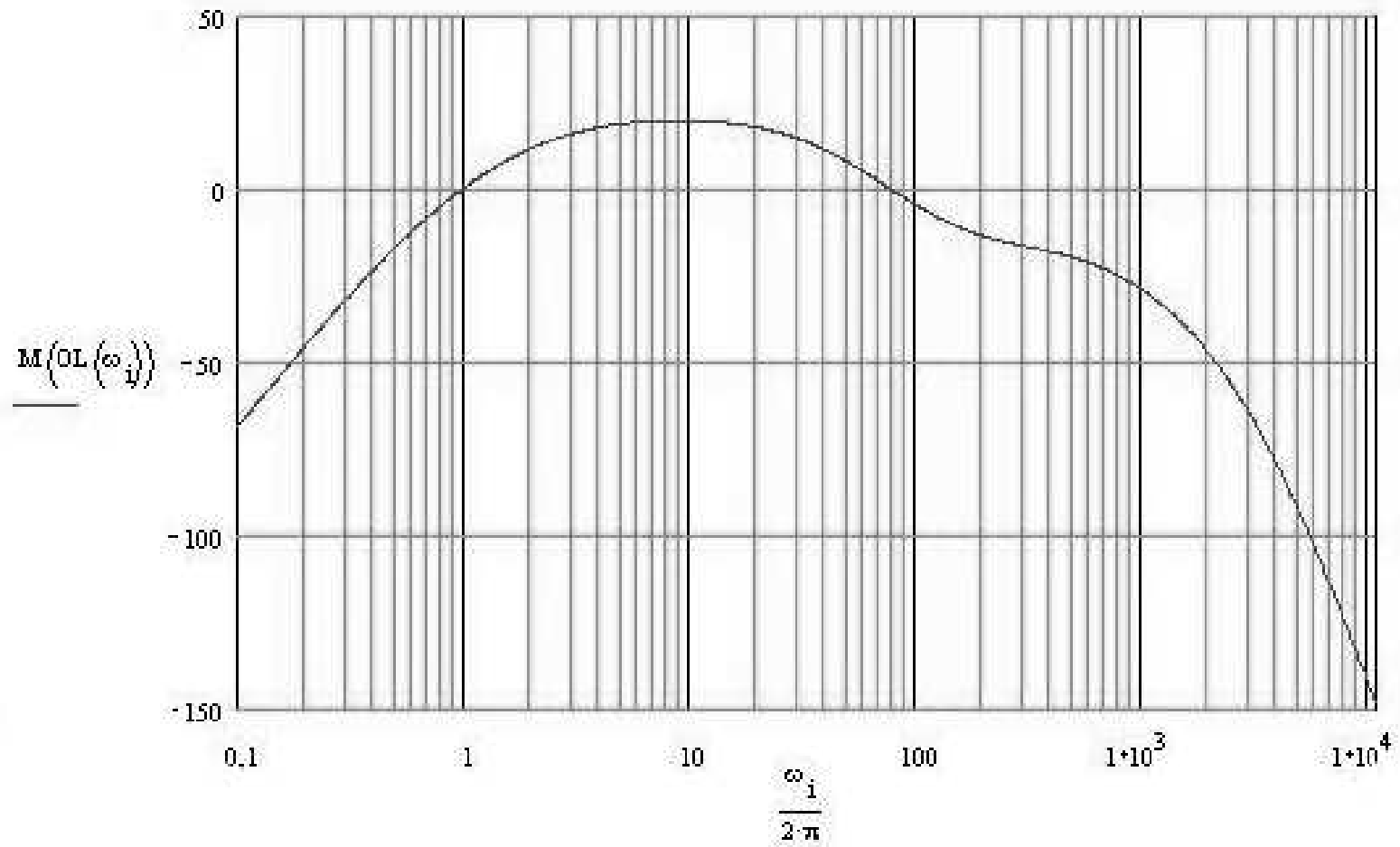
Measurement of the eddy current effect of the beampipe



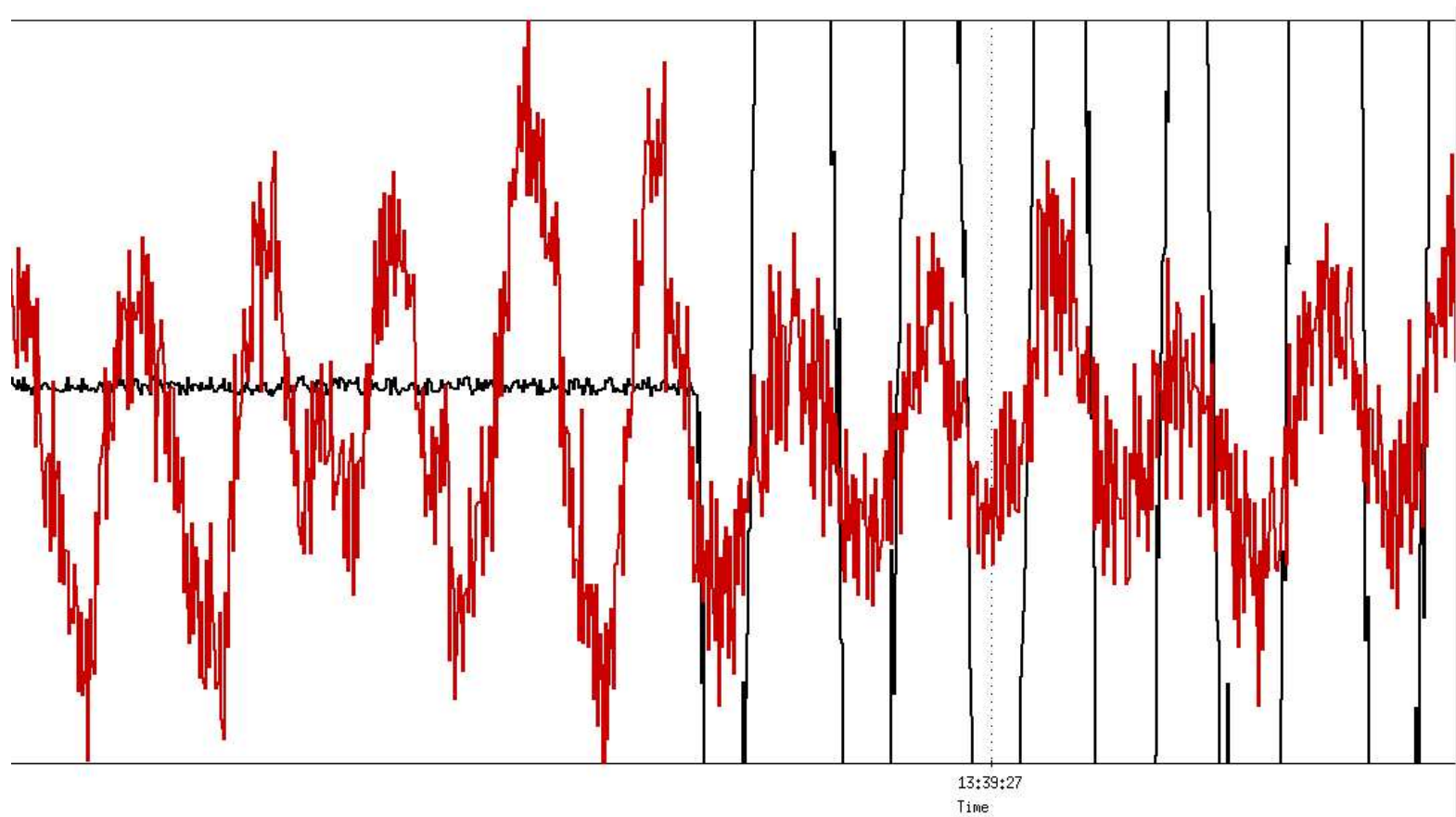


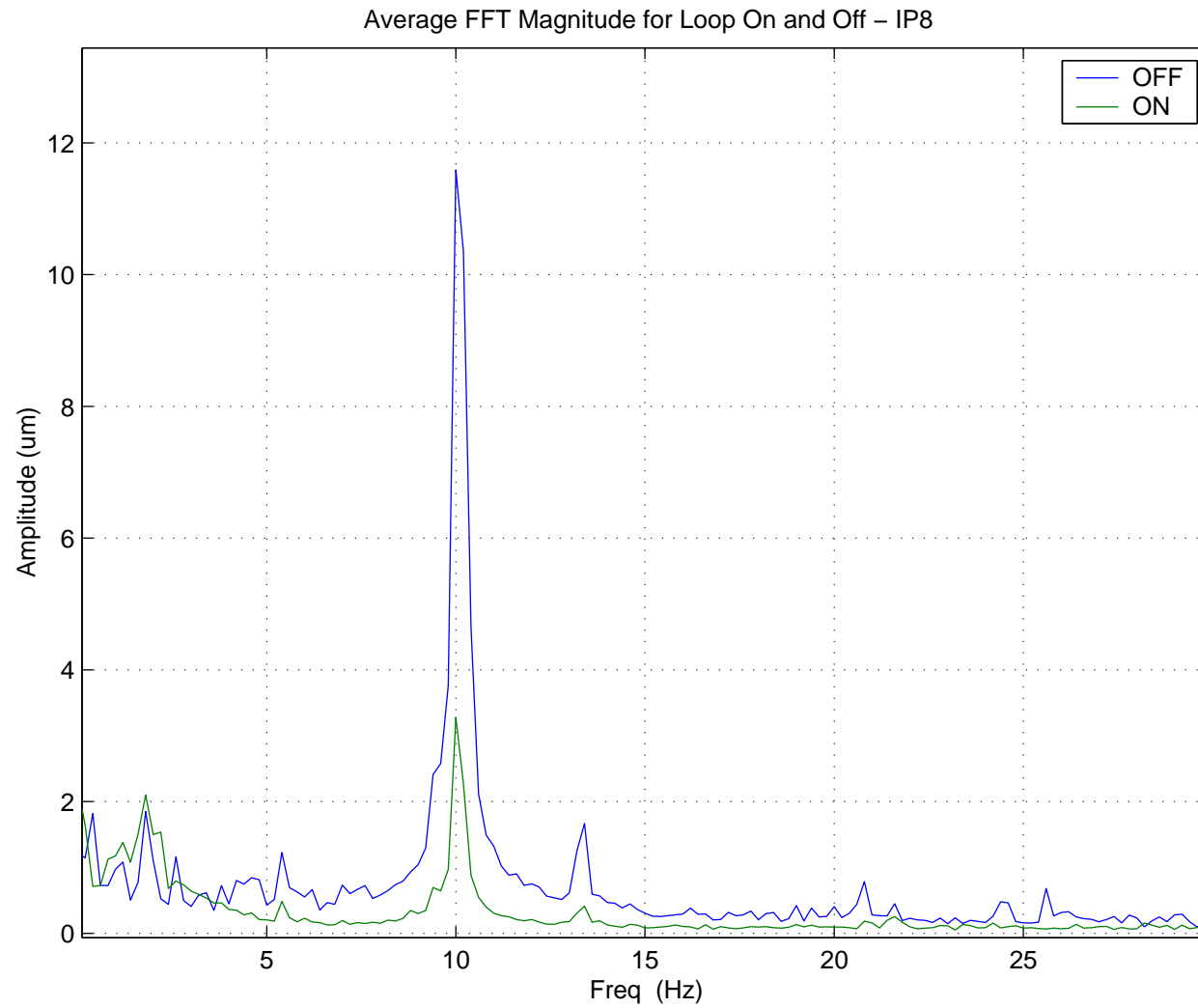
Cutoff frequency: 48 Hz, needs to be incorporated into feedback design

Open loop gain



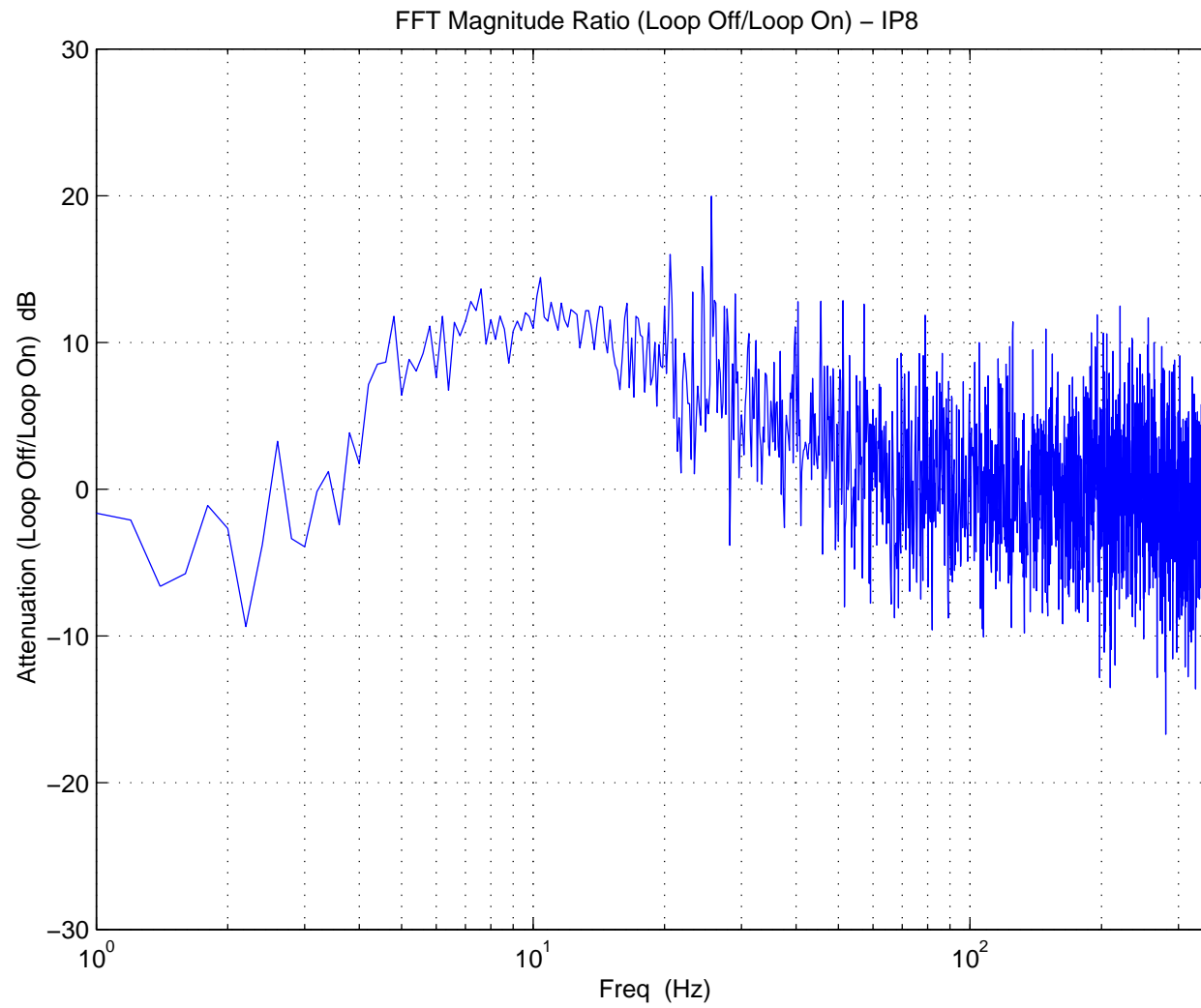
IR orbit offset with feedback ON/OFF





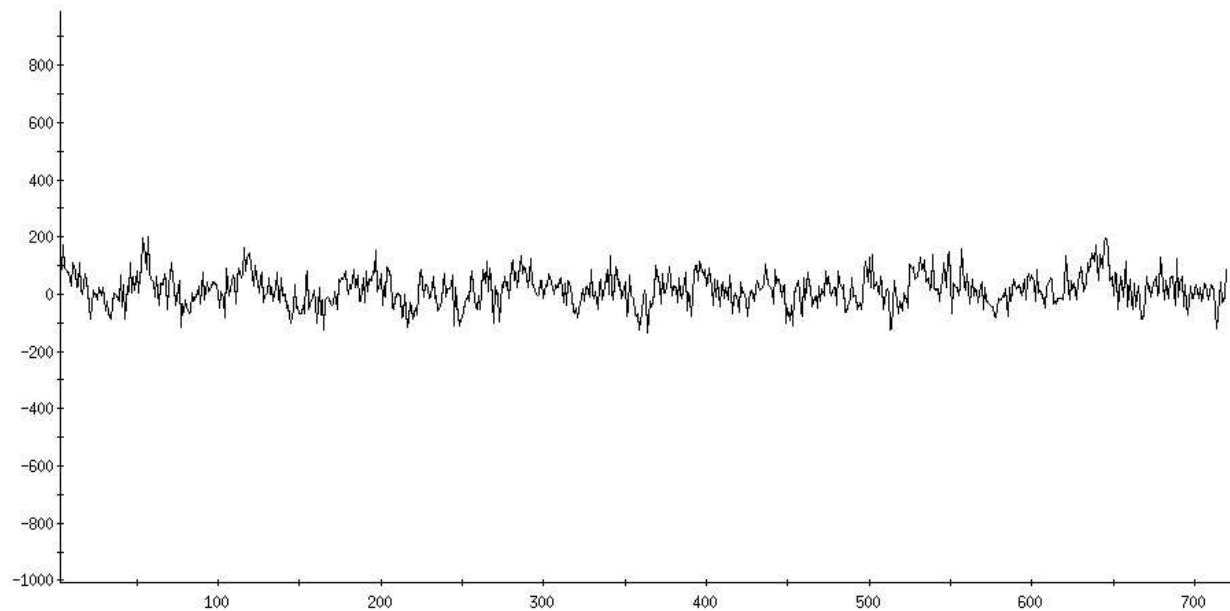
Factor > 3 (12 dB) attenuation at 10 Hz

Measured attenuation



Known limitations

BPM electronics show “high” frequency noise.



This electronics noise is compensated by the IR feedback, moving the blue beam.

⇒ High frequency beam-beam offset is increased.

Low-pass filtering necessary to remove high frequency noise,
but:

ADC/DAC delays do not allow adding any low-pass filters
(feedback loop becomes unstable).

⇒ Looking for new DSP boards with different type of
ADC/DAC that do not cause delay.

Conclusion and Outlook

- Factor 3 attenuation at 10 Hz has been achieved
- During two stores at 31.2 GeV, the system operated for several hours.
- When the feedback was turned off, the luminosity life-time did not change. Possible reasons include large emittance, or high-frequency noise.
- Present system will be operational for FY07.
- Looking for new DSP board to overcome high-frequency noise problems.